CLAIMS

1.   (Original) A system comprising:

a microscope that provides an image of a biological specimen in digital form, the microscope responsive to a control signal to change a parameter used to obtain the image of the biological specimen, the parameter including at least one of an objective lens, a focus, a light level, and a specimen position;

a database that includes one or more pathology profiles associated with one or more pathologies, the one or more pathology profiles derived from images of one or more other biological specimens having one or more pathologies;

a decision support system that processes the image from the microscope to obtain an image profile, the image profile including descriptive data of the image, the decision support system comparing the image profile to the one or more pathology profiles in the database to identify one or more of the one or more pathologies that are candidates for a pathology associated with the biological specimen; and

a client interface through which one or more remote users receive the image of the biological specimen and provide input to the system including at least one of generating the control signal to the microscope, communicating with other ones of the one or more remote users, and controlling operation of the decision support system.

2.   (Original) The system of claim 1 wherein the microscope employs an auto-focusing algorithm that retains a history of one or more previous auto-focus settings.

3.　　　(Original) The system of claim 1 further comprising an archival system which provides unsupervised image feature extraction and automated management of images of additional biological specimens for addition to the database.

4.　　　(Original) The system of claim 1 wherein the decision support system is trained using a ground truth database of images having independently confirmed pathologies.

5.　　　(Original) The system of claim 4 wherein the pathologies are independently confirmed using at least one of immunophenotyping, molecular studies, or gene expression.

6.　　　(Original) The system of claim 1 wherein the decision support system compares the image profile to one of the one or more pathology profiles by quantitatively comparing a derived measure of shape, texture, and area for the image profile to a derived measure of shape, texture, and area for the one of the one or more pathology profiles.

7.　　　(Original) The system of claim 6 wherein the derived measure of shape comprises a plurality of elliptical Fourier coefficients for an outline of a shape of one or more components of the biological specimen.

8.　　　(Original) The system of claim 6 wherein the derived measure of texture is calculated using a multiscale simultaneous autoregressive model.

9.　　　(Original) The system of claim 1 wherein the one or more pathologies include hematological disorders.

10.   (Original) A method comprising:

providing a database that includes one or more pathology profiles associated with one or more cells having one or more pathologies, the pathology profile for each pathology including a shape measure derived from a shape of one or more cells associated with the pathology, a texture measure derived from a texture of the one or more cells associated with the pathology, and an area measure derived from an area of the one or more cells associated with the pathology;

receiving an image of a cell in digital form;

processing the received image to obtain a query vector that includes a shape measure of the cell in the received image, a texture measure of the cell in the received image, and an area of the cell in the received image; and

comparing the query vector to the one or more pathology profiles in the database to obtain a quantitative measure of similarity between the cell in the received image and one of the one or more cells having one or more pathologies.

11.   (Original) The method of claim 10 further comprising suggesting a diagnosis for the cell in the received image based upon the quantitative measure of similarity.

12.   (Original) The method of claim 10 wherein comparing the query vector to the one or more pathology profiles further comprises calculating, for each pathology profile in the database, a weighted sum of a difference between each of the shape measure, the texture measure, and the area for the pathology profile and the shape measure, the texture measure, and the area for the query vector.

13.　　(Original) The method of claim 10 wherein the one or more pathologies include one or more hematological disorders.

14.　　(Original) The method of claim 10 wherein processing the received image to obtain a query vector that includes a shape measure of the cell in the received image further comprises:

converting the image from a red-green-blue representation to a luminance-chrominance representation;

locating a plurality of coordinates of an outer boundary of at least one of the cell or one or more constituent components of the cell; and

characterizing the outer boundary with a plurality of elliptical Fourier coefficients.

15.　　(Original) The method of claim 10 wherein processing the received image to obtain a query vector that includes a texture measure of the cell in the received image further comprises selecting a plurality of overlapping windows within the received image and, for each one of the plurality of overlapping windows, calculating a texture at a plurality of resolutions.

16.　　(Original) The method of claim 15 further comprising applying a multiscale simultaneous autoregressive model.

17.　　(Original) A system comprising:

database means for providing a database that includes one or more pathology profiles associated with one or more cells having one or more pathologies, the pathology profile for each pathology including a shape measure derived from a shape of one or more cells associated with the pathology, a texture measure derived from a texture of the one or more cells associated with

5

the pathology, and an area measure derived from an area of the one or more cells associated with the pathology;

imaging means for receiving an image of a cell in digital form;

processing means for processing the received image to obtain a query vector that includes a shape measure of the cell in the received image, a texture measure of the cell in the received image, and an area of the cell in the received image; and

comparing means for comparing the query vector to the one or more pathology profiles in the database to obtain a quantitative measure of similarity between the cell in the received image and one of the one or more cells having one or more pathologies.

18.   (Original) A computer program product comprising:

computer executable code for providing a database that includes one or more pathology profiles associated with one or more cells having one or more pathologies, the pathology profile for each pathology including a shape measure derived from a shape of one or more cells associated with the pathology, a texture measure derived from a texture of the one or more cells associated with the pathology, and an area measure derived from an area of the one or more cells associated with the pathology;

computer executable code for receiving an image of a cell in digital form;

computer executable code for processing the received image to obtain a query vector that includes a shape measure of the cell in the received image, a texture measure of the cell in the received image, and an area of the cell in the received image; and

computer executable code for comparing the query vector to the one or more pathology profiles in the database to obtain a quantitative measure of similarity between the cell in the received image and one of the one or more cells having one or more pathologies.

19.   (Original) A method of doing business comprising:

providing a database that includes one or more pathology profiles associated with one or

more pathologies, the pathology profile for each pathology including a shape, a texture, and an

area for one or more images of biological specimens that carry the pathology;

providing a decision support system for comparing a new specimen to the one or more

pathology profiles and identifying a pathology from the one or more pathology profiles

associated with the new specimen; and

providing a server that includes a client interface through which a user may submit the

new specimen to the decision support system from a remote location in a network, the server

providing a result from the decision support system to the user at the remote location.

20.   (Original) The method of claim 19, the server further configured to share the result and

the image among a plurality of users, and to forward electronic communications between two or

more of the plurality of users.

21.   (Original) The method of claim 20 wherein the electronic communications include at

least one of instant messaging, audio, text, or electronic mail.

22.   (Original) The method of claim 19 further comprising:

providing a microscope that provides an image of a biological specimen in digital form,

the microscope responsive to a control signal to change a parameter used to obtain the image of

the biological specimen, the parameter including at least one of an objective lens, a focus, a light

level, and a specimen position; and

providing a user interface through which one or more of a plurality of users, connected to the client interface through a data network, receive the image of the biological specimen and generate the control signal to the microscope.

23. (Original) The method of claim 22 wherein one of the plurality of users has a token that provides to the one of the plurality of users exclusive control over the control signal to the microscope.

24. (Original) The method of claim 19 wherein the decision support system compares a measure of shape, a measure of texture, and an area of the new specimen to a measure to a measure of shape, a measure of texture, and an area of each of the one or more pathology profiles.